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IMPROVEMENT OF WATERWAY TRANSPORT IN SOUTH VIET-NAM

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IMPROVEMENT OF WATERWAY TRANSPORT IN SOUTH VIET-NAM

I. Description of the navigable waterway system

The Mekong delta area covers a quarter of south Viet-Nam and contains about half of its population. It is one of Asia's most productive rice-growing areas. The area is traversed by the Mekong, which divides into five branches, the other four being the Bassac, the two Vaicos and the river Saigon. In addition, a great number of natural and artificial waterways give access to nearly all inhabited localities in the interior.

The navigable waterways of south Viet-Nam total 5,032 km, made up as follows:

Large rivers	1,252 km
Small rivers	1,411
Main canals	1,594
Second class canals	612
Third class canals	163
	5,032

As the area of south Viet-Nam is 67,863 km^2 there is an average of 74 km of navigable waterway per 1,000 km^2, the highest after Holland.

The canals have the following dimensions:

	Cross Section in m^2	Width in m	Depth in m
Main canals	90 - 120	40	3.5 - 4
Second class canals	40 - 90	25	2.5 - 3
Third Class canals	8 - 15	10	1.5 - 2

All the watercourses are affected by the tide. The average tidal range is 1 m - 1.5 m on the main canals and 0.5 m - 1 m on the secondary canals. The tidal currents have the advantage of maintaining or increasing depth at the beginning of canals. However, canal sections where two currents from two main watercourses meet may silt up and have to be dredged regularly. The government now dredges 4 million cu m a year for the maintenance and excavation of canals.

/II. Waterway

II. Waterway Transport

a) Craft

With such a system of navigable waterways there is naturally a wide variety of craft in south Viet-Nam, ranging from small sampans with paddles or an outboard motor to heavy junks of 400 tons. The categories of interest here are: launches, tugs, wooden junks and steel barges.

The launches, which between the wars competed with the railways and roads for goods and passenger transport, are beginning to disappear with the improvement of the road system, the better conditions offered by trucks and the lower safety factor on waterways. Motor sampans are now replacing launches to advantage for carriage of goods and passengers over short distances; there are 1,503 craft in service totalling 7,700 tons.

Tugs haul trains of about a dozen junks. They take advantage of tidal currents, but their towing power is very low: 1 hp for 10 tons of cargo. This gives a relative speed of 4 kph, but with a favourable tidal current of 3 kph the total speed is satisfactory. Now convoy regulations no longer allow them to wait for the tide; this requires a power of about 1 hp per 4 tons.

Junks are used for carrying rice and paddy. They have to be built of SAO wood, which is hard enough to resist ship-worm (teredo navalis). Their numbers are declining because of the shortage of timber and skilled labour, the latter being a consequence of the former. The following table gives typical dimensions and crew for the various tonnages used in South Viet-Nam:

Carrying capacity tons	Length m	Width m	Height m	Loaded draught m	Crew
20	13	4	1.35	1.05	3
50	20	5.5	1.6	1.30	3
100	24	6.5	2	1.65	4
200	29	7	2.6	2.25	5
250	30	8	2.8	2.45	7
330	32	8.5	3.35	3	9

/Steel barges

Steel barges properly ventilated are ideal for carrying rice. They can be built for use with pusher-tugs; one oil company has experimented with them and should be tried out for rice transport. They will undoubtedly be used in the future, as timber should be reserved for small junks and sampans. They can be powered by diesel engines for speed and easy handling.

b) Craft statistics

Steam vessels

	1939	1954	1959	1962
Number	136	23	29	26(1)
Tonnage	-	"	800T	650T
Engine power	5,200 hp	2,260 hp	3,250 hp	2,840 hp

Motor vessels

	1939	1954	1959	1962
Number	392	49	1,490	2,643(2)
Tonnage	-	"	29,310T	39,100T
Engine power	14,200 hp	1,690 hp	56,370 hp	72,800 hp

Barges and junks

	1939	1954	1959	1962
Number	3,823	749	923	1,020(3)
Tonnage	285,200T	86,190T	105,600T	100,500T

N.B.: These figures are from the river craft mortgage lists. The figures given by the Supervisory Commission are as follows:

1) Steam vessels in service:

4 only in service (124 tons, 480 hp); the other 22 were withdrawn long ago and are being dismantled.

/2) Motor

2) Motor vessels in service (excluding those belonging to oil companies)

a)	Tugs 80 hp or over	41	(5,000 hp)
b)	Powered barges and launches	13	(3,700 tons)
c)	Powered junks 100 tons or over	150	(25,000 tons)
d)	Small motorboats used for small-scale interprovincial transport	1,503	(7,700 tons)

3) Junks and barges in service

Wooden junks	250	(37,00 tons)
Metal barges	9	(1,400 tons)

/III. Barge and

II. Barge and tug requirements

Under the technical assistance programme the United Nations sent a TAB, ILO and FAO expert mission headed by Mr. Carter Goodrich to Viet-Nam. After several months in Viet-Nam (December 1955 - February 1956) the mission prepared a report on the country's economic development prospects. We reproduce in annex B the mission's recommendations regarding inland waterway vessels. Although the report was prepared in 1956 the recommendations are still valid.

The Government is making great efforts to restore all the delta water-courses to their pre-war state and is cutting new canals. However, the private sector has not ventured to invest in new barges and tugs for several reasons: lack of capital, insecurity, a much-reduced volume of freight. Only one carrier, holding the contract for army transport, has been able to build a few barges and tugs with financial assistance from the Government.

The Goodrich mission estimated that the total volume of freight carried annually before the war was about 1,200 million ton-km.

We have calculated the minimum number of vessels needed only on the basis of essential goods such as paddy and rice, clinker, charcoal and building materials.

a) Paddy and rice. Rice production exceeded the first five-year plan target. In 1960 the cultivated area was 2,312,000 ha and production 4,950,000 tons of paddy, a yield of over 20 quintals per ha (the 1956 figures were 2,060,000 ha, 2,740,000 tons and 12.3 quintals). Under the second five-year plan, 6 million tons are to be produced in 1966 and 500,000 tons of rice exported. An estimated 1,400,000 tons of rice and paddy will then have to be transported: 900,000 tons of paddy for export after processing and 500,000 tons of rice for consumption in Saigon.

b) Clinker The Ha-Tien cement works will begin production in 1964 and provision will have to be made for transporting 240,000 tons of clinker a year to Saigon.

c) Charcoal from Namcan: 60,000 tons a year.

d) Miscellaneous goods, building materials etc.: 100,000 tons a year.

/This makes

This makes a total of 1,800,000 tons, which, multiplied by an average distance of 300 km, gives 540 million ton-km as an essential minimum.

For flexibility of operation we have adopted the proportions of 40 per cent powered barges and 60 per cent dumb barges, the 1,800,000 tons of freight being thus divided as follows:

Powered barges	720,000 tons
Dumb barges	1,080,000 tons

The powered barges would each make 26 round trips a year, fully loaded to Saigon, thus carrying $\frac{720,000}{26}$ = 28,000 tons, i.e. 80 craft of about 350 tons each.

The dumb barges would each make 12 round trips a year: $\frac{1,080,000}{12}$ = 90,000 tons, i.e. 360 craft of 250 tons each.

The tugs can make 22 round trips a year with a towing power of 1 hp for 4 tons of cargo:

$$\frac{1,080,000}{22 \times 4} = 12,300 \text{ hp, i.e. 31 tugs of 400 hp each.}$$

Conclusion

South Viet-Nam needs a river fleet consisting of:

80 powered barges of 350 tons
360 dumb barges of 250 tons
31 tugs of 400 hp

If this programme is spread over ten years, the following will have to be built each year:

8 powered barges of 350 tons
36 dumb barges of 250 tons
3 tugs of 400 hp

Saigon has one fairly well equipped French ship-building yard (CARIC) and several Vietnamese yards. The latter need the services of a ship-building expert and machine-tools (shearing, folding, bending, welding machines). A small floating dock is needed for maintenance. Diesel engine mechanics will also have to be trained.

/Annex I

ANNEX B

Recommendations of the Carter Goodrich Mission

1187. Since, in South Viet-Nam, inland waterway transport is definitely the most economical means of moving bulk cargo, it is recommended that the Government should actively support its development.

1188. It can be inferred from a chart of pre-war waterway transport that, even if Cantho becomes a major rice exporting centre, restoration of the inland water transport fleet to at least pre-war level would be indicated in view of the increased needs of the larger population which will largely offset the savings resulting from a centralization of rice exports.

1189. Small craft can be built of wood according to tranditional designs. For larger craft, however, in view of the present lack of suitable timber and skilled carpenters, it is suggested that steel barges be constructed. Materials and labour for such construction are available and steel barges offer certain advantages (lower maintenance costs and lower insurance rates), while they have proved to be suitable for the transport of paddy and rice and their initial cost is now comparable to that of wooden vessels.

1190. A prototype design for standard 200-ton steel barges might be prepared by an expert. Models should be tank-tested and subsequently a few vessels should be built and used in actual operations. Subsequently, a standard design, modified as may be required, should be placed at the disposal of private operators who wish to expand their fleets.

1191. For the sake of standardization, the Government should encourage private enterprises to build new vessels according to the standard design, possibly by establishing a system of easy credits.

1192. In order to encourage some measure of standardization of engines, it is suggested that a foreign engine manufacturer be induced to establish an assembly plant with maintenance and repair works in the country. Certain

/concessions

concessions and guarantees should be given to make the engines produced locally cheaper than those imported. It is suggested that an expert be charged with the drawing up of a prospectus containing the necessary information for those who might be interested in the scheme.

1193. Existing plans for the organization of an inland water transport operators' association should be given all possible encouragement and support by the Government.

1194. In order to obtain experience with hydrofoil-supported craft, which may have a future for the transport of passengers and perishable goods in South Viet-Nam, the Army and the Navigation Service might purchase a few units of this type to serve as patrol vessels and inspection craft respectively.

ANNEX C

An estimate of Profits

Three main river lines link Saigon with the major rice-growing centres:

- Saigon/Ba-xuyên/An-xuyên (Khanh-Hung, Vinh-Loi, Quan-Long);
- Saigon/Phong-dinh/Kiêng-giang (Cân-tho, Rach-gia);
- Saigon/Ang-ang (Long-xuyên, Châu-Doc)

The length of the routes to Saigon varies from 200 km to 300 km (average 250 km). Powered barges and junks can usually make 3 round trips a month, tugs 2 round trips and junks without engines and dumb barges 1 round trip, taking into account the idle time involved in loading and unloading cargo.

A fourth line is expected to open at the end of 1963 for carrying clinker from the Ha-Tien cement works to the plant at Thu-Duc in barge trains at the rate of 2 trains a month (the estimated annual production is 240,000 tons).

The following calculations give the operating accounts for each type of vessel:

1. Powered barge of 350 tons
2. Dumb barge of 250 tons
3. Tug of 400 hp

Powered barge of 350 tons carrying rice

I. General data

a) Cost of a 350 ton powered barge with a 200 hp diesel engine:

Hull 35 piastres x 70,000 kg	2,450,000 P
200 hp diesel engine	900,000
Tackle and accessories	250,000
	3,600,000 P

/b) Crew:

b) Crew:

2 steersmen	8,000 P
2 mechanics	5,500
2 boatmen	4,000
1 cook	1,500
	20,000 P
Social security contribution	4,000
	24,000 P per month

c) Fuel:

Gas-oil: 0.20 litres/hop/hour, i.e. 0.2 x 200 hp = 40/h at 6 P per litre.

Lubricant: 0.0035 litres/hp/hour, i.e. 0.0035 x 200 hp = 0.7/hour at 15 P per litre.

d) Hours of sailing on each round trip, Saigon/Ba-Xuyên (250 km):

Out	35 h
Return	45 h
	80 h per round trip

e) Number of Saigon/Ba-Xuyên round trips a year:

During the 4 months of rice harvest: 3 round trips a month, with a quarter load (about 100 tons) out and full load return (350 tons). For 7 months of the year: 2 round trips a month, with a quarter load (about 100 tons) out and half load return (about 200 tons). One month idle for repairs and careening.

f) Transport rate: 0.90 P per metric ton

g) Depreciation, maintenance, taxes and charges, general and miscellaneous expenses:

Depreciation:	20 years for hull and accessories
	8 years for engine
Maintenance:	5 per cent a year
Interest on capital:	5 per cent a year
General expenses:	10 per cent of annual expenditure
Insurance, license, tax:	120,000 P a year
Tax on income:	16 per cent

/II. Operating account

II. Operating account

A. Annual revenue

a) 4 harvest months:

0.90 P x (100 + 350 tons) x 250 km x 4 m x 3 round trips = 1,215,000 P

b) 7 other months:

0.90 P x (100 + 200 tons) x 250 km x 7 m x 2 round trips = 945,000

Total: 2,160,000 P

B. Annual expenditure

Vessel

Depreciation - Hull	$\frac{2,450,000}{20}$ = 122,500 P		
- Engine, etc.	$\frac{1,150,000}{8}$ = 144,000	266,500	
Maintenance & interest on capital 10% of 3,600,000		= 360,000	
Crew: 24,000 P x 12		= 288,000	
Fuel:			
Gas-oil: 6 P x 40 litres x 80 hours x 26 round trips	= 499,200		
Lubricant: 15 P x 0.7 x 80 x 26	= 21,840		
	521,040		
Plus 10% for manoeuvring	52,060	573,100	
General expenses 10%		148,400	
Insurance, license, tax		120,000	
		1,756,000 P	
Gross profit: 2,160,000 - 1,756,000	= 404,000 P		
Less 16% profits tax	64,640		
Net profit	= 339,360 P a year		

/Metal dumb

Metal drumb barge of 250 tons carrying cereals

I. General data

a) Cost of 250 ton metal barge (empty weight 50 tons):

Hull: 35 P x 50,000 kg	=	1,750,000 P
Fittings:	=	50,000
Total:		1,800,000

b) Crew

2 boatmen	=	3,000 P
Social security contribution	=	600
Total:		3,600 P a month

c) Number of round trips a year (Saigon/Ba-Xuyên or Saigon/Au-Giang: 250 km)

1 round trip a month, 12 a year

From Saigon with one-fifth capacity weight

Return to Saigon with full load — 250 tons

d) Transport rate

0.60 P per ton/km (exclusing towing charges)

The towing charge is borne by the owner of the goods carried (0.20 P per ton/km)

e) Depreciation, maintenance, taxes and charges, general and miscellaneous expenses

Depreciation of barge:	20 years
Maintenance (3%) + interest on capital (5%):	8 %

General expenses 10% of annual expenditure

Insurance, fees and taxes: 30,000 P a year

Tax on income 16%

II. Operating account

A. Annual revenue

12 round trips

Saigon/Ba-Xuyên 0.60 P x 250 km x 50 tons x 12 round trips	=	90,000 P
Ba-Xuyên/Saigon 0.60 P x 250 km x 250 tons x 12 round trips	=	450,000
		540,000 P

/B. Annual

B. Annual expenditure

Vessel - depreciation $\frac{1,800,000}{20}$		90,000 P
Maintenance and interest on capital (8%)		144,000
Crew		43,200
		277,200
General expenses (10%)		27,800
Insurance, License, taxes		30,000
	Total	335,000 P

Gross profit 540,000 - 335,000 = 205,000 P

Less 16% profits tax 33,000

Net profit 172,000 P a year

Tug of 400 hp towing junks and barges
with paddy between Saigon and Ba-Xuyen

1. General data

a) Cost of a new tug:

Hull, tackle, etc.		2,000,000 P
Two 200 hp engines and accessories		3,000,000
		5,000,000

b) Crew:

2 steersmen	8,000 P
2 mechanics	6,500
2 boatmen	4,000
1 cook	1,500
	20,000
Social security contribution	4,000
	24,000 P per month

c) Fuel:

Gas-oil: 0.2 litres/hp/hour, i.e. 0.2 x 400 = 80 litres/hour at 6 P a litre

Lubricant: 0.0035 litres/hp/hour, i.e. 0.0035 x 400 = 1.4 litres/hour at 15 P a litre

d) Number of round trips Saigon/Ba-Xuyen:

2 a month, 22 a year; 1 month idle for repairs and careening.

e) Number of hours sailing on each round trip (250 km x 2 = 500 km):

Outward with empty barges: 5 kph : $\frac{250}{5}$ = 50 hours

Return with loaded barges: 3 kph: $\frac{250}{3}$ = 83 hours

133 hours per round trip

i.e. 133 x 22 = 2,926 or 3,000 hours a year.

f) Convoy load: Saigon/Ba-Xuyen: empty barges

Ba-Xuyen/Saigon: 6 tons x 400 = 2,400 tons

/g) Towing

g) Towing charge:

0.20 P per ton/km Ba-Xuyen/Saigon (loaded barges)

0.10 P per ton/km Saigon/Ba-Xuyen (empty barges)

h) Depreciation, maintenance, insureance, general expenses, tax on income and various charges:

Depreciation:	20 years for hull and accessories
	8 years for engines
Maintenance:	5% a year
Interest on capital:	5% a year
General expenses:	10% of annual expenditure
Insurance, licence and various taxes:	240,000 P a year
Tax on income:	16%

II. Operating account

a) Annual revenue

Towing barges with paddy

0.20 P x 250 km x 2,400 tons x 22 round trips = 2,640,000 P

Towing empty barges

0.10 P x 250 km x 2,400 tons x 22 round trips = 1,320,000

Total 3,960,000

b) Annual expenditure

Vessel

Depreciation of hull :	$\frac{2,000,000}{20}$ =	100,000 P	
" of engines:	$\frac{3,000,000}{8}$ =	375,000	475,000
Maintenance and interest on capital (2 x 5%):			500,000
Crew : 24,000 P x 12			288,000
Fuel : Gas-oil 6 x 80 x 3,000 = 1,440,000			
Lubricant 15 x 1.4 x 3,000 =		63,000	1,503,000
			2,766,000
General expenses (10%)			276,000
Insurance, licence, taxes			240,000
			3,282,000 P
Gross profit: 3,960,000 - 3,282,000			678,000
Less 16% profits tax			108,000
		Net profit	570,000 P a year